



Huntington Power Plant

6 miles west of Huntington, Utah on Hwy. 31
P.O. Box 680
Huntington, Utah 84528

October 12, 2017

Mr. Bryce Bird, Director
Utah Department of Environmental Quality
Division of Air Quality
195 North 1950 West
P.O. Box 144820
Salt Lake City, UT 84114-4820

**RE: 3rd Quarter, 2017 Particulate Matter Compliance Test Report - 40 CFR 63 SubPart UUUUU,
Huntington Power Plant Unit 2 (Title V Permit #1501001004)**

Dear Mr. Bird,

In accordance with Title V Permit Condition II.B.3.f.1(b) and 40 CFR §63.10021(d) the Huntington Power Plant submits this 3rd Quarter 2017 Particulate Matter (PM) Compliance Test Report for Unit 2.

This submittal is intended to satisfy the report submittal for Huntington Unit 2, and includes the portable document format (PDF) report that is submitted electronically via the Emissions Collection and Monitoring Plan System (ECMPS).

The summary results of the 3rd Quarter 2017 PM test results are:

Unit	Emission rate (lb/mmBtu)
2	0.008

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information, or omitting statements and information, including the possibility of fine or imprisonment.

Should you have any questions regarding this information, please contact Richard Neilson, Huntington Power Plant Environmental Engineer at (435) 687-4334 or me at (435) 687-4211.

Sincerely,

Darrell Cunningham
Managing Director and Responsible Official, Huntington Plant

Enclosures: Emissions Testing Report for PacifiCorp Huntington Unit 2 – Particulate Matter Compliance Testing
cc: David Barnhisel

Michael Stovern, USEPA Region VIII, w/enclosures, by electronic communication
Sara Loiacono, USEPA Region VIII, w/enclosures, by electronic communication



Emissions Testing Report for PacifiCorp
Huntington Unit 2
Huntington, Utah

Particulate Matter Compliance Testing

40 CFR Part 63, Subpart UUUUU

Test Date: September 19, 2017

Project Code PC17-0001.12

Executive Summary

EMCo was contracted by PacifiCorp to conduct compliance testing at the Huntington Power Plant near Huntington, Utah. Testing was performed to determine emission rates of particulate matter (PM) from the exhaust stack of Huntington Unit 2. Compliance test results are summarized in the table below; detailed test results are given in the following report.

PacifiCorp Huntington Power Plant PM Compliance Test Results Summary						
Source	Parameter	Date	Average Value	Emission Limit		
Huntington Unit 2	Filterable Particulate Matter	9/19/2017	0.008	0.030 lb/mmBtu		
			0.08	0.30 lb/MW-hr		
Each result is the average of three two-hour test runs.						
Abbreviations: lb/mmBtu: pounds per million British thermal units lb/MW-hr: pounds per megawatt hour						

Introduction

EMCo was contracted by PacifiCorp to conduct source testing services at the Huntington Power Plant near Huntington, Utah. The Huntington Plant comprises two pulverized coal-fired boilers. Huntington Unit #2 is equipped with low-NO_x burners and overfire air for NO_x control, an FGD scrubber for SO₂ control and pulse-jet fabric filters for PM control. Testing was conducted in accordance with the requirements of 40 CFR Part 63 Subpart UUUUU, National Emission Standards for Hazardous Air Pollutants (NESHAP): Coal- and Oil-Fired Electric Utility Steam Generating Units.

Contact information for the project is listed in the table below.

Contact	Affiliation	Telephone	E-mail
Frank Zampedri Environmental Analyst	PacifiCorp	(801) 220-2169	frank.zampedri@pacificorp.com
Richard Neilson Environmental Engineer		(435) 687-4334	richard.neilson@pacificorp.com
Norm Erikson Environmental Scientist	UDEQ	(801) 536-4063	nerikson@utah.gov
Scott Bouchard Field Project Manager	EMCo	(303) 495-3936	sbouchard@montrose-env.com

Scope of Work

Testing was performed to determine concentrations and mass emission rates of particulate matter (PM) for comparison to the applicable emission limits listed in the table below.

Source	Regulation	Parameter	Emission Limit
Huntington Unit 2	NESHAP UUUUU	PM (lb/mmBtu)	0.030 lb/mmBtu
		PM (lb/MW-hr)	0.30 lb/MW-hr
Abbreviations: lb/mmBtu: pounds per million British thermal units lb/MW-hr: pounds per megawatt-hour			

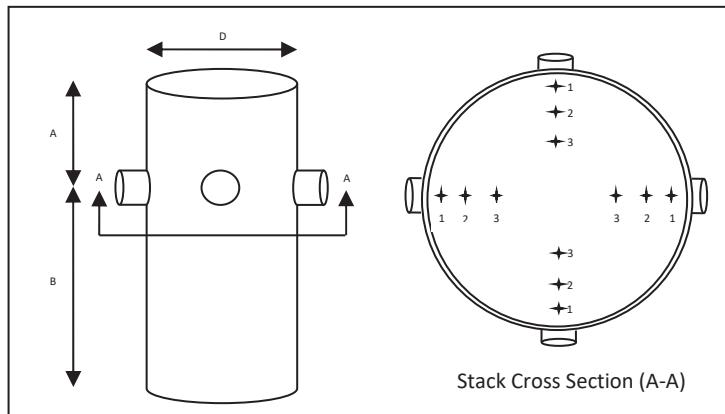
Testing Methods

EMCo used the following EPA Reference Methods for the testing program. No deviations from the Reference Methods were noted.

Parameter	EPA Reference Methods	Test Runs/Duration	Target Sample Volume
PM (lb/mmBtu)	1, 2, 3B, 4, 5*, 19	3 @ 2 hr	2 dscm (70.63 dscf)**
*In accordance with Table 5 of NESHAP Subpart UUUUU, the front-half temperature was set at 320° ± 25°F.			
**Sample volume from Table 2 of NESHAP Subpart UUUUU, doubled in accordance with §63.10005.			

Testing Location

The Huntington Unit 2 exhaust sampling location consists of a vertical, circular stack with four orthogonal sampling ports located at least six diameters downstream and two diameters upstream of the nearest flow disturbances. PM testing was performed across a grid of 12 points determined using EPA Method 1. See the schematic below.



Huntington Test Diagram	
Unit #	2
Diameter (D)	322.7"
Upstream Distance (A)	>220'
Downstream Distance (B)	>266'
Sample Point Distances from Stack Wall	
Traverse Point 1	14.1"
Traverse Point 2	47.3"
Traverse Point 3	95.5"

Test Results

The results of the testing program are given in the tables below. Detailed test results are located in Appendix A, along with sample calculations for all computed values.

PacificCorp Huntington Unit 2 PM Compliance Test Results Summary (9/19/2017)						
Parameter	Run #1	Run #2	Run #3	Average	QA Specification	Emission Limit***
Start Time	10:09	12:48	15:44	—	—	—
Stop Time	12:20	15:17	17:54	—	—	—
Sample Gas Volume (dscf)	71.84	73.21	74.34	73.13	>70.63*	—
Isokinetic Variation (%)	93.5	94.6	96.0	94.7	100 ± 10%	—
Filterable PM (lb/mmBtu)	0.008	0.009	0.007	0.008	—	0.030
Boiler Load (MW)	464	472	473	470	>459**	—
Filterable PM (lb/MW-hr)	0.08	0.09	0.07	0.08	—	0.30

* Sample volume from Table 2 of NESHAP Subpart UUUUUU, doubled in accordance with §63.10005.
**90% of design capacity, in accordance with §63.10007(a)(2).
***As shown, average PM emissions were less than 50% of the applicable emission limit, qualifying the unit for Low Emitting EGU (LEE) status.

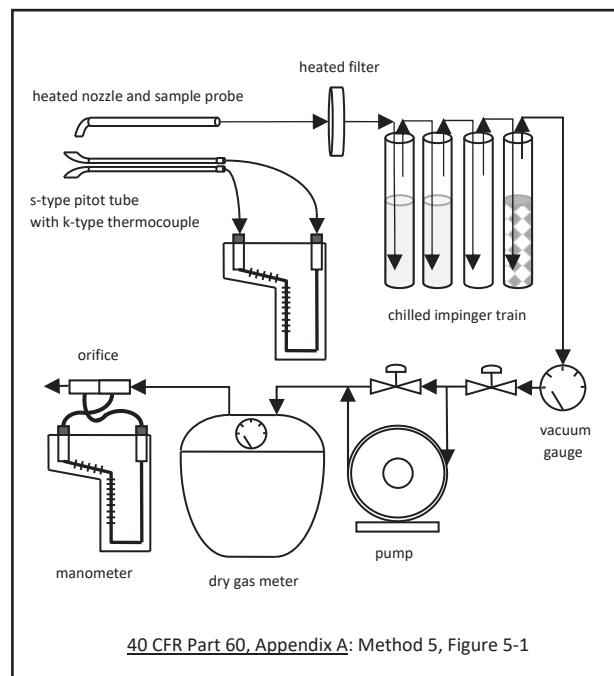
Testing Equipment

All testing equipment was housed in a climate-controlled mobile analytical laboratory designed and built by EMCo. All required quality assurance tests were performed as required by the applicable Reference Methods. Detailed equipment descriptions are given in the table below.

Parameter	Equipment	EPA Reference Method(s)
Particulate Matter (PM)	Heated probe with glass nozzle and stainless steel probe liner Quartz fiber filter S-type pitot tube K-type thermocouple Inclined-vertical manometer Dry gas meter Digital scale Analytical balance	1, 2, 3B, 4, 5, 19

Test Details

Particulate matter testing was performed using EPA Methods 1, 2, 3B, 4 and 5. Each test run was 120 minutes in duration. Sampling was performed along a grid of points determined using EPA Method 1. Exhaust gas flow measurements were taken using an S-type pitot tube, K-type thermocouple and inclined-vertical manometer in accordance with EPA Method 2. A sample of exhaust gas was withdrawn from the stack at an isokinetic flow rate through a heated stainless steel nozzle and probe, through a heated quartz-fiber filter, through four chilled glass impingers containing known masses of water or silica gel, and through a dry gas meter. (See Figure 5-1 at right.) The default dry molecular weight for combustion sources (30 lbs/lb-mole) listed in EPA Method 3 was combined with pressure and temperature measurements to calculate stack gas velocity in accordance with EPA Method 2. Stack gas moisture concentrations were determined gravimetrically in accordance with EPA Method 4. Following each sampling period, the filter and rinses of the nozzle and probe were recovered and returned to EMCo's laboratory for gravimetric analysis. Following analysis, the particulate mass captured during each test run was combined with concurrent flow and moisture data to calculate particulate matter emissions in units of pounds per hour (lb/hr). The particulate mass captured during each test run was combined with concurrent CO₂ concentration data from the plant CEMS¹ and the appropriate fuel F-factor from EPA Method 19 (1,800 scf/mmBtu) to calculate PM emissions in units of pounds per million British thermal units (lb/mmBtu) for comparison to the applicable emission limit.



¹ EPA Method 3B §6.0 states "As an alternative to the sampling apparatus and systems described herein, other sampling systems may be used, provided such systems are ... capable of yielding acceptable results." As NESHAP UUUUUU requires certified Part 75 CEMS CO₂ data to calculate SO₂ and mercury emissions in units of lb/mmBtu, CEMS CO₂ data are considered acceptable for PM emission calculations as well.

Appended Information

Supporting data for this testing program are included as follows.

Appendix A: Test Summary

- Data Reduction Spreadsheet
- Sample Calculations

Appendix B: Field Data

- Field Datasheets

Appendix C: Laboratory Data

- Gravimetric Analysis

Appendix D: CEMS Data

- Test Run CEMS Printouts

Appendix E: Calibration Information

- Dry Gas Meter Pre-Test and Post-Test Calibrations
- Critical Orifice Calibration Certificate



Project PC17-0001
Appendix A: Test Summary
Data Reduction Spreadsheets
Sample Calculations

PC17-1.12
PaciCorp
Huntington Unit 2
9/19/2017

Θ	Run #	1	2	3
	Start Time	10:09	12:48	15:44
	Stop Time	12:20	15:17	17:54
	Sample Time (min.)	120	120	120
EPA Method 2 Data		1	2	Average
Inputs				
D _s	Stack Diameter (inches)	322.7	322.7	322.7
P _{bar}	Barometric Pressure ("Hg)	23.38	23.38	23.38
P _g	Stack Static Pressure ("H ₂ O)	-3.2	-3.2	-3.2
C _p	Pitot Tube Coefficient (unitless)	0.84	0.84	0.84
Δp _{avg}	Avg. Velocity Head of Stack Gas V("H ₂ O)	0.8468	0.8532	0.8517
T _s	Stack Gas Temperature (°F)	113	113	113
Calculations				
A	Stack Area (ft ²)	567.970	567.970	567.970
P _g	Stack Static Pressure ("Hg)	-0.24	-0.24	-0.24
M _d	Stack Gas Molecular Weight, dry basis (lb/lb-mole)	30.00	30.00	30.00
M _s	Stack Gas Molecular Weight, wet basis (lb/lb-mole)	28.53	28.53	28.57
P _s	Absolute Stack Pressure ("Hg)	23.14	23.14	23.14
T _{s(abs)}	Absolute Stack Gas Temperature (°R)	573	573	573
V _s	Stack Gas Velocity (ft/sec)	56.6	57.1	56.9
Q	Stack Gas Dry Volumetric Flow Rate (dscf/hr)	72,461,097	73,008,748	73,072,726
Q	Stack Gas Dry Volumetric Flow Rate (dscf/min)	1,207,685	1,216,812	1,217,879
CEMS Diluent Data		1	2	Average
CO ₂ (%vw)		10.3	10.0	10.1
CO ₂ (%vd)		11.7	11.4	11.5
EPA Method 4 Data		1	2	Average
Inputs				
V _{lc}	Volume of Water Condensed (mL)	246.0	220.4	214.3
V _m	Volume of Stack Gas Collected (dcf)	94.273	95.342	97.534
Y	Meter Calibration Factor (unitless)	1.0016	1.0016	1.0016
ΔH	Pressure Differential Across Orifice ("H ₂ O)	1.7	1.8	1.8
T _m	Temperature at Gas Meter (°F)	85	81	85
Calculations				
P _m	Absolute Pressure at Gas Meter ("Hg)	23.51	23.51	23.51
T _m	Absolute Temperature at Gas Meter (°R)	545	541	545
V _{wc(std)}	Volume of Water Condensed (scf)	11.58	10.37	10.08
V _{m(std)}	Sample Gas Volume (dscf)	71.84	73.21	74.34
B _{ws act}	Observed Stack Gas Moisture Content (%/100)	0.139	0.124	0.119
B _{ws sat}	Saturated Moisture Content (%/100)	0.122	0.122	0.122
B _{ws}	Moisture Content Used (%/100)	0.122	0.122	0.119
EPA Method 5 Data		1	2	Average
Inputs				
D _n	Nozzle diameter (")	0.235	0.235	0.235
C1	Mass of PM collected on filter (mg)	8.9	11.4	8.8
C2	Mass of PM collected in rinses (mg)	7.7	8.3	8.5
Emission Calculations				
F _c	Fuel F-Factor (scf/mmBtu)	1800	1800	1800
A _n	Cross-sectional area of nozzle (ft ²)	3.01E-04	3.01E-04	3.01E-04
I	Isokinetic variation (%)	93.5	94.6	96.0
m _n	Total Filterable PM mass less blank (mg)	16.6	19.7	15.6
C _s	Filterable Particulate concentration (gr/dscf)	0.004	0.004	0.003
C _s	Filterable Particulate concentration (lb/dscf)	5.09E-07	5.93E-07	4.63E-07
E _{lb/hr}	Filterable Particulate mass emission rate (lb/hr)	37	43	34
	Boiler Load (MW)	464	472	473
	Filterable Particulate mass emission rate (lb/MW-hr)	0.08	0.09	0.07
F _c	Filterable Particulate mass emission rate (lb/mmBtu)	0.008	0.009	0.007
8760 hrs/yr	Filterable Particulate mass emission rate (tons/year)	162	190	148

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

Variables

Variable	Value	Definition	Unit of Measurement
D _s	322.7	Stack Diameter	inches
A	567.97	Cross-Sectional Area of the Stack	ft ²
P _g	-3.20	Stack Static Pressure	in. H ₂ O
P _g	-0.24	Stack Static Pressure	in. Hg
%CO ₂	11.7	Concentration of Carbon Dioxide	Dry Volume Percent (%vd)
%O ₂	n/a	Concentration of Oxygen	Dry Volume Percent (%vd)
M _d	30.00	Dry Molecular Weight of the Stack Gas (default)	lb/lb-mole
P _{bar}	23.38	Barometric Pressure	in. Hg
ΔH	1.70	Pressure Differential across Orifice	in. H ₂ O
P _m	23.51	Absolute Pressure at Gas Meter	in.Hg
t _m	85	Temperature at Gas Meter	°F
T _m	545	Absolute Temperature at Gas Meter	°R
K1	0.04706	Conversion Factor	ft ³ /mL
V _{lc}	246.0	Volume of Water Condensed	g
V _{wc(std)}	11.58	Volume of Water Condensed	scf
K ₄	17.64	Constant	°R/in.Hg
Y	1.0016	Meter Calibration Factor	Unitless
V _m	94.273	Volume of Stack Gas Collected	dcf
V _{m(std)}	71.836	Sample Gas Volume	dsfc
B _{ws}	0.122	Stack Gas Moisture Content	%/100
M _s	28.53	Actual Molecular Weight of the Stack Gas	lb/lb-mole
P _s	23.14	Absolute Stack Pressure	in. Hg
T _s	113	Average Stack Temperature	°F
T _{s(abs)}	573	Average Absolute Stack Temperature	°R
K _p	85.49	Conversion Factor	(ft/sec) x V(((lb/lb-mole)(in.Hg))/((°R)(in.H ₂ O)))
C _p	0.84	Pitot Coefficient	Dimensionless
AvgVΔp	0.8468	Average Square Root of Velocity Head Readings	in. H ₂ O
V _s	56.64	Average Stack Gas Velocity	ft/sec
T _{std}	528	Standard Absolute Temperature	°R
P _{std}	29.92	Standard Absolute Pressure	in. Hg
Q	72,461,097	Dry Volumetric Flow Rate Corrected to Standard Conditions	dsfc/hr
D _n	0.235	Nozzle Diameter	inches
A _n	3.01E-04	Cross-Sectional Area of the Nozzle	ft ²
m _n	16.60	Total PM and CPM Mass	mg
C _s	5.09E-07	Particulate Concentration	lb/dsfc
E _{lb/hr}	36.9	PM Mass Emission Rate	pounds per hour
F _c	1800	F-Factor from EPA Method 19	scf/mmBtu
E _{lb/mmBtu}	0.008	PM Mass Emission Rate	pounds per million Btu
E _{tons/yr}	161.7	PM Mass Emission Rate	tons per year
K5	0.0945	Constant	(in.Hg · min) / (°R · sec)
Θ	120	Sample Time	minutes
I	93.5 %	Isokinetic variation	percent

PC17-1.12
PaciFiCorp
Huntington Unit 2
Run #1 Sample Calculations

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

$$A = \pi(D_s/24)^2$$

$$\pi(322.7/24)^2$$

$$= 567.97 \text{ ft}^2$$

$$P_g = P_{bar}/13.6$$

$$= -3.2/13.6$$

$$= -0.24 \text{ in. Hg}$$

$$M_d = 30.00 \text{ lb/lb-mole}$$

$$P_m = P_{bar} + (\Delta H/13.6)$$

$$= 23.38 + (1.7/13.6)$$

$$= 23.51 \text{ in. Hg}$$

$$T_m = 460 + t_m$$

$$= 460 + 85$$

$$= 545 \text{ R}$$

$$V_{wc(std)} = K_1 \times V_{lc}$$

$$= 0.04706 \times 246$$

$$= 11.58 \text{ scf} \quad (Eq. 4-1)$$

$$V_{m(std)} = \frac{K_4 \times Y \times V_m \times P_m}{T_m}$$

$$= \frac{17.64 \times 1.0016 \times 94.273 \times 23.51}{545}$$

$$= 71.84 \text{ dscf} \quad (Eq. 4-3)$$

$$B_{ws} = \frac{V_{wc(std)}}{V_{wc(std)} + V_{m(std)}}$$

$$= \frac{11.58}{11.58 + 71.84}$$

= 0.139 (%/100) (Eq. 4-4) [Observed value above saturation; calculated saturation value used for subsequent calculations.]

$$M_s = M_d \times (1 - B_{ws}) + (18.0 \times B_{ws})$$

$$= 30.00 \times (1 - 0.122) + (18.0 \times 0.122)$$

$$= 28.53 \text{ lb/lb-mole} \quad (Eq. 2-6)$$

$$P_s = P_{bar} + P_g$$

$$= 23.38 + (-0.24)$$

$$= 23.14 \text{ in. Hg}$$

$$T_{s(abs)} = 460 + T_s$$

$$= 460 + 113$$

$$= 573 \text{ R}$$

PC17-1.12
PacifiCorp
Huntington Unit 2
Run #1 Sample Calculations

EPA Method 5: Determination of Particulate Matter Emissions (40 CFR Part 60, Appendix A-1)

$$V_s = K_p \times C_p \times \text{Avg}v/\Delta p \times \sqrt{\frac{T_{s(\text{abs})}}{(P_s \times M_s)}}$$

$$= 85.49 \times 0.84 \times 0.8468 \times \sqrt{\frac{573}{(23.14 \times 28.53)}}$$

$$= 56.6 \text{ ft/sec}$$

(Eq. 2-7)

$$Q = 3600 \times (1 - B_{ws}) \times (V_s) \times (A) \times \frac{(T_{\text{std}} \times P_s)}{(T_{s(\text{abs})} \times P_{\text{std}})}$$

$$= 3600 \times (1 - 0.122) \times (56.64) \times (567.97) \times \frac{(528 \times 23.14)}{(573 \times 29.92)}$$

$$= 72,461,097 \text{ dscf/hr}$$

(Eq. 2-8)

$$A_n = \pi(D_n/24)^2$$

$$\pi(0.235/24)^2$$

$$= 3.01E-04 \text{ ft}^2$$

$$C_s = \frac{m_n}{(mg/g)(g/lb)(V_{m(\text{std})})}$$

$$= \frac{16.6}{(1000)(453.592)(71.836)}$$

$$= 5.09E-07 \text{ lb/dscf}$$

$$E_{lb/hr} = C_s \times Q$$

$$= 5.09E-07 \times 72461097$$

$$= 36.9 \text{ lb/hr}$$

$$E_{lb/mmBtu} = \frac{C_s \times F_c \times 100}{(CO_2\%vd)}$$

$$= \frac{5.09E-07 \times 1800 \times 100}{(11.7)}$$

$$= 0.008 \text{ lb/mmBtu}$$

$$E_{tons/yr} = \frac{E_{lb/hr} \times (\text{Hrs/yr})}{(\text{lbs/ton})}$$

$$= \frac{36.92 \times 8,760}{2000}$$

$$= 161.7 \text{ tons/year}$$

$$I = \frac{K5 \times T_{s(\text{abs})} \times V_{m(\text{std})} \times 100}{P_{s(\text{abs})} \times V_s \times A_n \times \Theta \times (1 - B_{ws})}$$

$$= \frac{0.0945 \times 573 \times 71.836 \times 100}{23.14 \times 56.64 \times 3.0E-04 \times 120 \times (1 - 0.122)}$$

$$= 93.5 \%$$

(Eq. 5-7)



Project PC17-0001
Appendix B: Field Data
Field Datasheets

Emissions Measurement Company: Method 5 Data Sheet

21528B

EMCo Job #:	045AQS-14007	Operator(s):	CW
Client:	Pacificorp	Barometric pressure ("Hg):	23.38
Source:	HTG 2	Static pressure ("H ₂ O):	-3.2
Date:	9/19/17	Leak Check ("H ₂ O @ Vac):	0.00 @ 14"
Run #	1	Leak Check ("H ₂ O @ Vac):	0.00 @ 15"
Meterbox ID:	MS-4	Pitot ID / Coeff:	/-84
Meterbox Y =	6.0016	dh@=	1.2935
O ₂ %:	8.9	Pitot Leak Check:	
CO ₂ %:	16.3	Nozzle Diameter:	.235
Start Time	1009	K Factor:	2.43
		Stop Time	1220

Impinger Weights (x.x g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total	784.8	1032.8
Total	246.0	

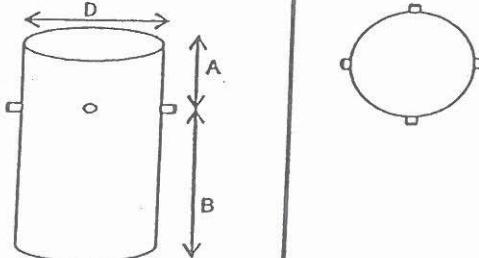
Traverse Point	Sample Time	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity ΔP ("H ₂ O)	Orifice Pressure ΔH ("H ₂ O)	Vacuum ("Hg)	Sample Volume (ft ³)	DGM Temp (°F) Inlet	DGM Temp (°F) Outlet	Imp. Outlet Temp (°F)
1 1	10	112	317	320	.60	1.5	5	041.982			
2	20	111	320	320	.70	1.7	5	049.4	73	71	51
3	30	114	320	320	.79	1.9	6	057.4	88	75	46
4	40	112	321	317	.63	1.5	5	073.7	92	82	49
2 1	50	113	319	319	.75	1.8	6	081.3	94	85	50
3	60	114	320	320	.83	2.0	6	089.8	92	87	52
3 1	70	111	317	321	.58	1.4	5	096.8	88	86	50
2	80	112	318	320	.71	1.7	6	104.4	93	86	48
3	90	113	316	318	.80	1.9	5	112.9	87	85	50
4 1	100	112	318	320	.62	1.5	5	120.2	87	86	48
2	110	112	320	319	.78	1.9	5	127.8	86	84	47
3	120	114	320	319	.85	2.1	6	136.255	85	85	44
12	120	113	316	317	.8468	1.7	6	094.273	85	85	52
Total	Total	Average	Minimum	Minimum	Avg VAp	Average	Max.	Total	Average	Average	Maximum

Stack Schematic

Stack Diameter (D)=

Distance A=

Distance B=



Point # Dist. From Stack Wall

1	
2	
3	
4	
5	
6	
7	
8	

mf

Emissions Measurement Company: Method 5 Data Sheet

215288

EMCo Job #:	045-A06-149077	Operator(s):	CW
Client:	Lantech	Barometric pressure ("Hg):	23.38
Source:	HTG U2	Static pressure ("H ₂ O):	-3.2
Date:	9/19/17	Leak Check ("H ₂ O @ Vac):	0.00 @ 12"
Run #	2	Leak Check ("H ₂ O @ Vac):	0.00 @ 14"
Meterbox ID:	MS-4	Pitot ID / Coeff:	✓ .84
Meterbox Y =	10016 ΔH = 1.7935	Pitot Leak Check:	✓
O ₂ %:	8.5	Nozzle Diameter:	.235
CO ₂ %:	10.3	K Factor:	2.47
Start Time	12:48	Stop Time	15:17

Impinger Weights (x x g)	Initial	Final
Impinger 1		
Impinger 2		
Impinger 3		
Impinger 4 (SG)		
Total	774.0	794.4
	Total	220.4

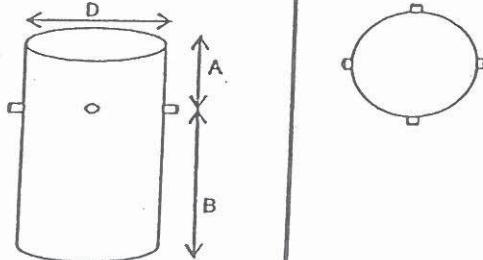
Traverse Point	Sample Time	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity Δp ("H ₂ O)	Orifice Pressure ΔH ("H ₂ O)	Vacuum ("Hg)	Sample Volume (ft ³)	DGM Temp (°F) Inlet	DGM Temp (°F) Outlet	Imp. Outlet Temp (°F)
① 1	10	113	319	317	.58/4	1.4	5	150.988			
2	20	113	320	320	.76/4	1.9	5	158.0	85	82	43
3	30	111	320	319	.85	2.1	6	166.01	86	84	45
② 1	40	113	316	319	.60	1.5	5	182.0	81	81	49
2	50	113	321	320	.78	1.9	6	190.2	81	81	52
3	60	113	319	321	.86	2.1	6	198.6	82	82	54
③ 1	70	112	320	320	.59	1.5	5	205.8	83	80	52
2	80	113	320	318	.72	1.8	5	213.8	82	79	55
3	90	113	319	320	.81	2.0	6	222.1	83	76	52
④ 1	100	112	320	321	.63	1.6	5	229.6	84	75	49
2	110	112	321	317	.75	1.9	6	237.7	84	75	46
3	120	113	322	319	.85	2.1	6	246.330	85	80	42
12	120	113	316	317	x 8532	1.8	6	95.342	81		55
Total	Total	Average	Minimum	Minimum	Avg Δp	Average	Max.	Total	Average		Maximum

Stack Schematic

Stack Diameter (D)=

Distance A=

Distance B=

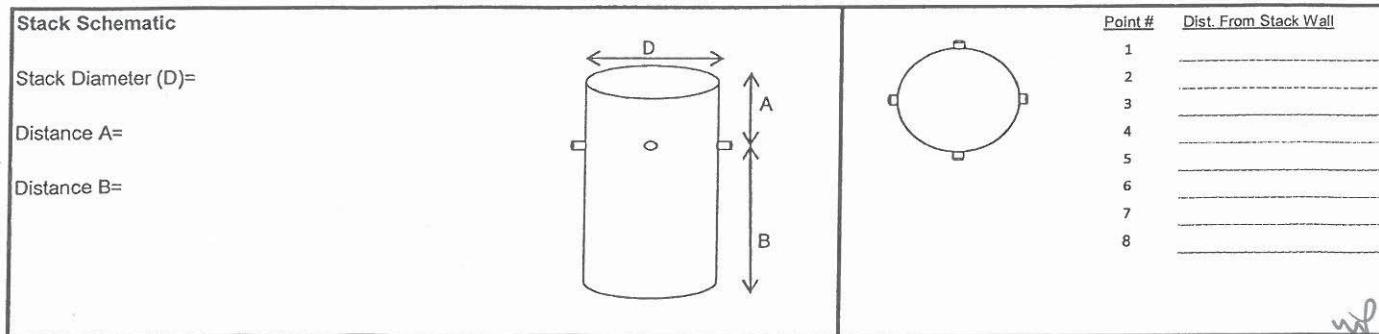


Point # Dist. From Stack Wall

1	
2	
3	
4	
5	
6	
7	
8	

Emissions Measurement Company: Method 5 Data Sheet

EMCo Job #:	045-AQS-21S288	Operator(s):	23 CW	Impinger Weights (x g)	Initial	Final					
Client:	PAC Corp	Barometric pressure ("Hg):	23.38	Impinger 1							
Source:	HTG 2	Static pressure ("H ₂ O):	-3.2	Impinger 2							
Date:	9/19/17	Leak Check ("H ₂ O @ Vac):	0.00 @ 12"	Impinger 3							
Run #	3	Leak Check ("H ₂ O @ Vac):	0.00 @ 14"	Impinger 4 (SG)							
Meterbox ID:	NS-4	Pitot ID / Coeff:	.84	Total	787.0	1001.3					
Meterbox Y =	1.0016 AH@= 1.7935	Pitot Leak Check:	V	Total	214.3						
O ₂ %:	8.5	Nozzle Diameter:	.235								
CO ₂ %:	10.3	K Factor:	.242								
Start Time	1544	Stop Time	1754								
Traverse Point	Sample Time	Stack Temp (°F)	Probe Temp (°F)	Filter Temp (°F)	Velocity Δp ("H ₂ O)	Orifice Pressure ΔH ("H ₂ O)	Vacuum ("Hg)	Sample Volume (ft ³)	DGM Temp (°F) Inlet	DGM Temp (°F) Outlet	Imp. Outlet Temp (°F)
								246.701			
1 1	10	112	320	319	.61	1.5	6	254.0	82	79	47
2	20	112	317	320	.72	1.7	7	261.8	82	78	45
3	30	114	318	319	.85	2.1	8	270.5	87	79	43
2 1	40	113	318	320	.62	1.5	6	278.0	86	79	40
2	50	112	315	321	.75	1.8	7	286.1	87	80	41
3	60	113	314	319	.85	2.1	8	295.0	88	81	42
3 1	70	114	321	318	.60	1.5	6	302.5	89	82	44
2	80	114	317	321	.74	1.8	7	311.0	90	82	46
3	90	114	319	320	.82	2.0	8	319.4	90	83	47
4 1	100	114	320	320	.62	1.5	6	327.0	91	83	49
2	110	114	320	321	.74	1.8	7	335.4	91	84	50
3	120	114	321	320	.82	2.0	8	344.235	91	84	50
12	120	(113)	314	318	,8517	(1.8)	8	1097.534	(85)	Average	50
Total	Total	Average	Minimum	Minimum	Avg VΔp	Average	Max.	Total		Maximum	





Project PC17-0001
Appendix C: Lab Data
Gravimetric Analysis

Project Code:	045AS-215285
Date Finalized:	10/2/2017
Analyst:	Craig Kormylo

Laboratory Results Summary	
Sample ID	Filterable Particulate Matter (mg)
Unit 2, Run #1	16.6
Unit 2, Run #2	19.7
Unit 2, Run #3	15.6

No blank corrections were performed.

Analytical Narrative

Quartz fiber filters were dessicated and tared to a constant weight in the EMCo laboratory prior to sampling. Following testing, the filters were dessicated for at least 24 hours, then weighed to a constant weight (± 0.5 mg). The acetone rinses were measured to the nearest milliliter, transferred to tared aluminum weighing dishes, taken to dryness under a fume hood, then weighed to a constant weight (± 0.5 mg). Each result above represents total filterable particulate matter for each test run (acetone rinse + filter catch), with no blank correction performed unless otherwise indicated.

Instrumentation

All measurements were taken using a Torbal Model AGCN200 Analytical Balance under laboratory conditions. The instrument is auto-calibrated and challenged with three NIST-traceable reference weights daily.

Detection Limit / Sensitivity

All measurements are recorded to 0.0001g (0.1mg).

Notes

No deviations from the analytical procedure from EPA Method 5 were noted. All samples were received in good condition. After analysis, all samples are archived for a period of one year.

Attachments

Gravimetric Analysis Logs

Sample Chain of Custody



EPA Method 5 Gravimetric Analysis Log

Project Code:	045AS-215285
Unit ID:	Unit 2

Front-Half Particulate Matter Filter Catch

Filter #	Run #1		Run #2		Run #3	
	Date	Weight (g)	Date	Weight (g)	Date	Weight (g)
Filter Weight #1 (g)	9/29/17	0.3880	9/29/17	0.3905	9/29/17	0.3844
Filter Weight #2 (g)	10/2/17	0.3882	10/2/17	0.3909	10/2/17	0.3849
Filter Tare Weight #1 (g)	6/29/17	0.3793	6/29/17	0.3792	6/29/17	0.3785
Filter Tare Weight #2 (g)	6/30/17	0.3791	6/30/17	0.3793	6/30/17	0.3785
Filter Catch (g)		0.0089		0.0114		0.0062

Front-Half Particulate Matter Acetone Rinse Catch

Rinse Volume (mL)	Run #1		Run #2		Run #3	
	Dish #	2118	2123	2115		
Filter Weight #1 (g)	9/27/17	6.504	9/27/17	6.489	9/27/17	6.5033
Filter Weight #2 (g)	9/29/17	6.5035	9/29/17	6.488	9/29/17	6.5031
Dish Tare Weight (g)	6/29/17	6.4963	6/29/17	6.4801	6/29/17	6.4937
Dish Tare Weight (g)	6/30/17	6.4959	6/30/17	6.4803	6/30/17	6.4938
Total Rinse Catch (g)		0.0077		0.0083		0.0094

Total Particulate Catch

	Run #1	Run #2	Run #3
Filter Catch (g)	0.0089	0.0114	0.0062
+ Rinse Catch (g)	0.0077	0.0083	0.0094
Total PM (g)	0.0166	0.0197	0.0156

Laboratory Chain of Custody Record

Project Code:	045AS-H7017 215285		
Client:	PACIFIC CORP		
Facility:	HUNTINGTON		
Unit:	2		
Sample Date(s):	9/19/17		
Project Manager:	S. BOUCHARD		
Sample ID / Run #	Filter ID	Trin ID	Notes
U2 R1	1458	2118	
R2	14441	2123	
R3	14446	2115	
Relinquished by:			Date: 9/22/17
Received by:			Date: 9/22/17



Project PC17-0001
Appendix D: CEMS Data
CEMS Printouts for Test Runs

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 10:09 Through 09/19/2017 12:20

Time Online Criteria: 1 minute(s)

Source	UNIT2					
	Parameter (Unit)	BARPRESS /INHG/	CO2 /PCT/	OPACITY /PCT/	STKTEMP /DEGF/	UNITLOAD /MMW/
09/19/17 10:09		23.523	10.2	1.8	113.12	459
09/19/17 10:10		23.521	10.1	1.8	112.66	460
09/19/17 10:11		23.520	10.3	1.8	110.46	461
09/19/17 10:12		23.521	10.4	1.8	109.81	461
09/19/17 10:13		23.519	10.3	1.7	109.71	462
09/19/17 10:14		23.520	10.3	1.7	109.51	463
09/19/17 10:15		23.521	10.4	1.7	109.26	463
09/19/17 10:16		23.522	10.3	1.8	109.28	463
09/19/17 10:17		23.523	10.3	1.9	109.54	462
09/19/17 10:18		23.524	10.3	1.8	109.94	462
09/19/17 10:19		23.524	10.2	1.8	110.23	460
09/19/17 10:20		23.522	10.2	1.8	109.77	459
09/19/17 10:21		23.523	10.2	1.8	109.00	460
09/19/17 10:22		23.523	10.2	1.7	108.98	461
09/19/17 10:23		23.521	10.3	1.8	108.94	462
09/19/17 10:24		23.517	10.3	1.7	109.22	463
09/19/17 10:25		23.516	10.4	1.7	110.76	464
09/19/17 10:26		23.518	10.3	1.6	112.22	463
09/19/17 10:27		23.515	10.3	1.6	112.91	461
09/19/17 10:28		23.521	10.2	1.7	113.10	460
09/19/17 10:29		23.522	10.2	1.8	112.99	459
09/19/17 10:30		23.518	10.2	1.7	113.00	461
09/19/17 10:31		23.520	10.3	1.6	113.06	462
09/19/17 10:32		23.517	10.2	1.7	112.97	465
09/19/17 10:33		23.527	10.5	1.6	112.64	468
09/19/17 10:34		23.528	10.5	1.6	112.56	470
09/19/17 10:35		23.522	10.3	1.6	112.68	470
09/19/17 10:36		23.524	10.4	1.5	112.88	468
09/19/17 10:37		23.522	10.3	1.5	113.27	463
09/19/17 10:38		23.520	10.1	1.5	113.71	460
09/19/17 10:39		23.526	10.0	1.5	113.76	458
09/19/17 10:40		23.526	10.0	1.5	113.72	458
09/19/17 10:41		23.525	10.1	1.5	113.64	458
09/19/17 10:42		23.522	10.2	1.6	113.60	458
09/19/17 10:43		23.524	10.1	1.6	113.58	458
09/19/17 10:44		23.521	10.2	1.7	113.64	458
09/19/17 10:45		23.519	10.3	1.7	113.54	458
09/19/17 10:46		23.529	10.4	1.7	113.15	458
09/19/17 10:47		23.525	10.4	1.8	113.15	460
09/19/17 10:48		23.532	10.3	1.8	113.44	461

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 10:09 Through 09/19/2017 12:20

Time Online Criteria: 1 minute(s)

09/19/17	10:49	23.523	10.2	1.8	113.50	463
09/19/17	10:50	23.526	10.3	1.9	113.39	465
09/19/17	10:51	23.523	10.3	1.9	113.27	466
09/19/17	10:52	23.525	10.3	1.9	113.41	466
09/19/17	10:53	23.525	10.3	1.9	113.51	465
09/19/17	10:54	23.527	10.2	1.8	113.70	464
09/19/17	10:55	23.528	10.1	1.8	113.88	463
09/19/17	10:56	23.524	10.1	1.8	113.84	462
09/19/17	10:57	23.525	10.2	1.8	113.73	461
09/19/17	10:58	23.516	10.2	1.8	113.57	461
09/19/17	10:59	23.526	10.2	1.8	113.48	461
09/19/17	11:00	23.533	10.2	1.8	113.54	461
09/19/17	11:01	23.529	10.1	1.8	113.79	460
09/19/17	11:02	23.521	10.1	1.8	113.93	461
09/19/17	11:03	23.525	10.2	1.7	114.03	461
09/19/17	11:04	23.528	10.2	1.7	113.87	462
09/19/17	11:05	23.517	10.2	1.7	113.70	462
09/19/17	11:06	23.521	10.2	1.7	113.82	463
09/19/17	11:07	23.520	10.2	1.6	113.82	464
09/19/17	11:08	23.518	10.2	1.7	113.60	465
09/19/17	11:09	23.519	10.4	1.6	113.06	465
09/19/17	11:10	23.518	10.4	1.7	112.02	465
09/19/17	11:11	23.522	10.4	1.6	110.93	464
09/19/17	11:12	23.524	10.3	1.6	110.85	463
09/19/17	11:13	23.526	10.3	1.5	110.53	462
09/19/17	11:14	23.526	10.4	1.5	110.62	462
09/19/17	11:15	23.524	10.4	1.6	110.55	461
09/19/17	11:16	23.522	10.5	1.6	110.46	463
09/19/17	11:17	23.526	10.5	1.7	110.29	464
09/19/17	11:18	23.526	10.6	1.7	110.09	466
09/19/17	11:19	23.525	10.6	1.6	109.46	468
09/19/17	11:20	23.524	10.5	1.6	108.97	469
09/19/17	11:21	23.523	10.5	1.6	108.95	469
09/19/17	11:22	23.524	10.4	1.6	109.68	468
09/19/17	11:23	23.523	10.4	1.7	110.45	467
09/19/17	11:24	23.523	10.4	1.7	112.28	466
09/19/17	11:25	23.523	10.4	1.7	112.89	465
09/19/17	11:26	23.524	10.4	1.8	113.31	465
09/19/17	11:27	23.523	10.4	1.8	113.64	464
09/19/17	11:28	23.523	10.3	1.7	113.77	465
09/19/17	11:29	23.525	10.2	1.8	113.87	466
09/19/17	11:30	23.525	10.2	1.7	114.04	466
09/19/17	11:31	23.523	10.2	1.7	113.99	466

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 10:09 Through 09/19/2017 12:20

Time Online Criteria: 1 minute(s)

09/19/17	11:32	23.523	10.3	1.7	113.76	466
09/19/17	11:33	23.527	10.3	1.8	113.76	465
09/19/17	11:34	23.525	10.3	1.8	113.97	465
09/19/17	11:35	23.523	10.3	1.8	114.12	465
09/19/17	11:36	23.523	10.3	1.9	114.00	465
09/19/17	11:37	23.526	10.3	1.8	113.81	466
09/19/17	11:38	23.525	10.4	1.8	113.64	467
09/19/17	11:39	23.520	10.5	1.7	113.79	467
09/19/17	11:40	23.517	10.4	1.7	114.00	468
09/19/17	11:41	23.520	10.4	1.7	114.01	467
09/19/17	11:42	23.519	10.3	1.7	114.02	466
09/19/17	11:43	23.525	10.3	1.7	114.17	465
09/19/17	11:44	23.524	10.3	1.7	114.21	465
09/19/17	11:45	23.522	10.2	1.7	114.12	462
09/19/17	11:46	23.517	10.2	1.8	111.96	461
09/19/17	11:47	23.516	10.3	1.7	111.44	462
09/19/17	11:48	23.517	10.4	1.7	111.41	463
09/19/17	11:49	23.516	10.3	1.7	110.95	464
09/19/17	11:50	23.516	10.5	1.7	110.64	465
09/19/17	11:51	23.516	10.4	1.7	110.52	467
09/19/17	11:52	23.516	10.5	1.7	110.62	469
09/19/17	11:53	23.515	10.5	1.8	110.94	470
09/19/17	11:54	23.516	10.5	1.8	111.00	470
09/19/17	11:55	23.515	10.3	1.9	110.78	470
09/19/17	11:56	23.515	10.3	1.9	110.69	469
09/19/17	11:57	23.515	10.3	1.8	110.74	467
09/19/17	11:58	23.512	10.1	1.9	110.97	467
09/19/17	11:59	23.513	10.2	1.7	111.03	467
09/19/17	12:00	23.517	10.0 I	1.7	111.03	468
09/19/17	12:01	23.516	4.6 I	1.6	113.61	468
09/19/17	12:02	23.519	9.4 I	1.6	113.74	467
09/19/17	12:03	23.518	10.3 I	1.6	113.83	466
09/19/17	12:04	23.516	10.2 I	1.5	114.16	465
09/19/17	12:05	23.518	10.1 I	1.6	114.42	464
09/19/17	12:06	23.519	10.2	1.7	114.27	465
09/19/17	12:07	23.518	10.4	1.6	113.96	467
09/19/17	12:08	23.517	10.4	1.5	113.84	469
09/19/17	12:09	23.516	10.4	1.5	113.85	471
09/19/17	12:10	23.518	10.5	1.5	113.77	472
09/19/17	12:11	23.522	10.4	1.5	113.93	472
09/19/17	12:12	23.519	10.3	1.5	114.25	471
09/19/17	12:13	23.520	10.3	1.6	114.41	469
09/19/17	12:14	23.523	10.3	1.6	114.45	468

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 10:09 Through 09/19/2017 12:20

Time Online Criteria: 1 minute(s)

09/19/17	12:15	23.524	10.3	1.6	114.55	466
09/19/17	12:16	23.524	10.3	1.5	114.61	466
09/19/17	12:17	23.522	10.2	1.5	114.62	467
09/19/17	12:18	23.518	10.3	1.6	114.50	468
09/19/17	12:19	23.519	10.4	1.6	114.17	469
09/19/17	12:20	23.519	10.5	1.6	114.29	470

Average	23.522	10.3	1.7	112.54	464
Minimum	23.512	10.0	1.5	108.94	458
Maximum	23.533	10.6	1.9	114.62	472
Summation	3,104.840	1,298.2	223.6	14,854.81	61,293
Included Data Points	132	126	132	132	132
Total number of Data Points	132	132	132	132	132

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

Report Generated 09/19/17 12:26

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 12:48 Through 09/19/2017 15:17

Time Online Criteria: 1 minute(s)

Source	UNIT2					
	Parameter (Unit)	BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEGF)	UNITLOAD (MMW)
09/19/17 12:48		23.515	10.4	1.8	111.55	471
09/19/17 12:49		23.519	10.4	1.8	111.59	468
09/19/17 12:50		23.513	10.3	1.9	111.70	467
09/19/17 12:51		23.512	10.2	2.0	111.97	466
09/19/17 12:52		23.511	10.1	2.2	112.02	466
09/19/17 12:53		23.508	10.1	2.1	112.15	468
09/19/17 12:54		23.511	10.1	2.0	112.02	471
09/19/17 12:55		23.514	10.2	2.0	111.23	474
09/19/17 12:56		23.514	10.3	2.0	110.83	475
09/19/17 12:57		23.512	10.3	1.9	111.00	477
09/19/17 12:58		23.512	10.1	1.9	111.50	477
09/19/17 12:59		23.513	10.1	1.8	112.11	476
09/19/17 13:00		23.509	10.0	1.8	114.32	474
09/19/17 13:01		23.507	9.9	1.8	114.96	472
09/19/17 13:02		23.508	9.8	1.8	115.52	470
09/19/17 13:03		23.511	9.8	1.8	115.30	467
09/19/17 13:04		23.512	9.8	1.8	115.33	466
09/19/17 13:05		23.511	9.8	1.8	115.31	466
09/19/17 13:06		23.509	10.0	1.8	115.00	467
09/19/17 13:07		23.511	10.0	1.8	114.81	469
09/19/17 13:08		23.508	10.1	1.8	114.68	471
09/19/17 13:09		23.510	10.1	1.8	114.52	474
09/19/17 13:10		23.511	10.0	1.7	114.78	475
09/19/17 13:11		23.509	10.0	1.6	115.08	476
09/19/17 13:12		23.508	10.0	1.6	114.89	475
09/19/17 13:13		23.507	10.0	1.7	114.88	474
09/19/17 13:14		23.511	10.0	1.7	115.02	472
09/19/17 13:15		23.509	9.8	1.7	115.31	470
09/19/17 13:16		23.509	9.7	1.7	115.65	469
09/19/17 13:17		23.506	9.7	1.7	115.62	468
09/19/17 13:18		23.509	9.8	1.7	115.36	469
09/19/17 13:19		23.510	9.9	1.7	115.08	470
09/19/17 13:20		23.510	9.9	1.7	115.00	472
09/19/17 13:21		23.512	10.0	1.7	114.87	473
09/19/17 13:22		23.516	10.0	1.7	114.73	474
09/19/17 13:23		23.514	9.9	1.6	114.96	474
09/19/17 13:24		23.512	9.9	1.6	115.19	473
09/19/17 13:25		23.512	9.9	1.6	115.27	473
09/19/17 13:26		23.509	9.9	1.6	115.17	472
09/19/17 13:27	F = Unit Offline	23.512	9.9	1.6	115.13	471

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 12:48 Through 09/19/2017 15:17

Time Online Criteria: 1 minute(s)

09/19/17	13:28	23.513	9.8	1.6	114.88	471
09/19/17	13:29	23.512	9.8	1.6	115.07	470
09/19/17	13:30	23.512	9.8	1.6	112.40	469
09/19/17	13:31	23.510	9.8	1.6	111.42	469
09/19/17	13:32	23.509	9.9	1.7	111.09	469
09/19/17	13:33	23.510	10.0	1.7	110.86	471
09/19/17	13:34	23.510	10.0	1.6	110.77	472
09/19/17	13:35	23.510	10.0	1.6	110.71	473
09/19/17	13:36	23.510	10.0	1.6	110.83	473
09/19/17	13:37	23.511	10.0	1.6	110.82	474
09/19/17	13:38	23.511	10.0	1.6	110.83	474
09/19/17	13:39	23.508	10.0	1.6	110.53	475
09/19/17	13:40	23.517	10.1	1.7	110.33	475
09/19/17	13:41	23.509	10.0	1.7	110.47	475
09/19/17	13:42	23.510	10.0	1.7	110.33	475
09/19/17	13:43	23.510	10.0	1.7	110.36	475
09/19/17	13:44	23.509	10.0	1.7	111.46	475
09/19/17	13:45	23.507	9.9	1.6	111.96	475
09/19/17	13:46	23.506	9.9	1.6	112.07	475
09/19/17	13:47	23.510	9.9	1.7	112.15	475
09/19/17	13:48	23.512	9.9	1.7	112.15	473
09/19/17	13:49	23.508	9.9	1.6	112.08	472
09/19/17	13:50	23.506	9.8	1.7	112.25	471
09/19/17	13:51	23.507	9.8	1.7	112.74	470
09/19/17	13:52	23.507	9.9	1.8	113.66	470
09/19/17	13:53	23.509	10.0	1.8	114.30	471
09/19/17	13:54	23.509	9.8	1.8	114.81	471
09/19/17	13:55	23.505	9.8	1.9	114.95	472
09/19/17	13:56	23.503	9.9	1.8	114.82	473
09/19/17	13:57	23.505	9.9	1.7	114.94	474
09/19/17	13:58	23.510	9.8	1.7	115.00	474
09/19/17	13:59	23.508	9.8	1.7	115.06	473
09/19/17	14:00	23.507	9.8	1.7	115.14	472
09/19/17	14:01	23.505	9.8	1.7	115.28	472
09/19/17	14:02	23.505	9.7	1.7	115.50	472
09/19/17	14:03	23.509	9.7	1.8	115.31	472
09/19/17	14:04	23.509	9.9	1.8	114.92	471
09/19/17	14:05	23.508	9.9	1.8	114.88	472
09/19/17	14:06	23.509	9.8	1.7	115.00	472
09/19/17	14:07	23.508	9.9	1.7	115.00	473
09/19/17	14:08	23.505	9.9	1.7	114.99	473
09/19/17	14:09	23.509	9.8	1.7	115.28	472
09/19/17	14:10	23.510	9.7	1.7	115.51	472

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 12:48 Through 09/19/2017 15:17

Time Online Criteria: 1 minute(s)

09/19/17	14:11	23.508	9.8	1.6	115.40	471
09/19/17	14:12	23.510	9.9	1.7	115.20	471
09/19/17	14:13	23.507	10.0	1.6	115.14	471
09/19/17	14:14	23.510	10.0	1.7	115.04	470
09/19/17	14:15	23.511	9.9	1.7	114.86	471
09/19/17	14:16	23.510	10.0	1.6	114.71	472
09/19/17	14:17	23.514	10.0	1.7	112.67	473
09/19/17	14:18	23.512	9.9	1.7	111.68	474
09/19/17	14:19	23.512	10.1	1.7	110.85	476
09/19/17	14:20	23.513	10.2	1.6	110.74	477
09/19/17	14:21	23.512	10.0	1.6	110.95	477
09/19/17	14:22	23.513	10.1	1.6	110.75	476
09/19/17	14:23	23.514	10.1	1.6	110.56	476
09/19/17	14:24	23.516	10.1	1.5	110.66	474
09/19/17	14:25	23.512	10.0	1.5	110.54	470
09/19/17	14:26	23.513	10.0	1.5	110.77	468
09/19/17	14:27	23.514	9.9	1.5	110.93	467
09/19/17	14:28	23.516	10.0	1.6	110.50	466
09/19/17	14:29	23.516	10.1	1.6	110.20	467
09/19/17	14:30	23.512	10.2	1.5	110.11	469
09/19/17	14:31	23.514	10.2	1.5	110.47	472
09/19/17	14:32	23.518	10.3	1.6	110.71	478
09/19/17	14:33	23.518	10.4	1.5	110.53	482
09/19/17	14:34	23.517	10.4	1.5	110.73	483
09/19/17	14:35	23.517	10.4	1.5	110.92	482
09/19/17	14:36	23.510	10.3	1.5	111.35	478
09/19/17	14:37	23.510	10.1	1.5	113.51	473
09/19/17	14:38	23.512	9.9	1.6	114.53	469
09/19/17	14:39	23.512	9.8	1.6	114.87	467
09/19/17	14:40	23.511	9.9	1.6	114.98	466
09/19/17	14:41	23.513	10.0	1.6	114.85	468
09/19/17	14:42	23.510	10.2	1.6	114.32	471
09/19/17	14:43	23.508	10.3	1.6	113.98	475
09/19/17	14:44	23.510	10.3	1.6	113.99	480
09/19/17	14:45	23.511	10.3	1.6	114.23	482
09/19/17	14:46	23.510	10.2	1.6	114.60	482
09/19/17	14:47	23.510	10.0	1.6	115.07	477
09/19/17	14:48	23.511	9.9	1.6	115.44	472
09/19/17	14:49	23.512	9.8	1.6	115.59	467
09/19/17	14:50	23.510	9.8	1.7	115.58	463
09/19/17	14:51	23.511	9.9	1.8	115.62	463
09/19/17	14:52	23.520	10.0	1.8	115.30	464
09/19/17	14:53	23.512	10.2	1.7	114.69	468

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 12:48 Through 09/19/2017 15:17

Time Online Criteria: 1 minute(s)

09/19/17	14:54	23.511	10.4	1.7	114.31	473
09/19/17	14:55	23.510	10.4	1.8	114.27	479
09/19/17	14:56	23.509	10.5	1.7	114.18	483
09/19/17	14:57	23.512	10.5	1.7	114.27	485
09/19/17	14:58	23.515	10.4	1.7	114.70	484
09/19/17	14:59	23.516	10.2	1.7	115.10	480
09/19/17	15:00	23.515	10.0	1.7	115.59	474
09/19/17	15:01	23.513	9.9	1.7	115.97	469
09/19/17	15:02	23.511	9.8	1.7	116.25	465
09/19/17	15:03	23.514	9.8	1.7	116.11	463
09/19/17	15:04	23.513	9.9	1.7	115.79	464
09/19/17	15:05	23.512	10.0	1.7	115.39	466
09/19/17	15:06	23.515	10.2	1.7	115.06	469
09/19/17	15:07	23.511	10.3	1.6	115.09	474
09/19/17	15:08	23.509	10.3	1.6	115.08	478
09/19/17	15:09	23.510	10.4	1.6	114.79	480
09/19/17	15:10	23.509	10.4	1.6	114.86	480
09/19/17	15:11	23.507	10.3	1.6	115.12	478
09/19/17	15:12	23.506	10.2	1.7	115.28	474
09/19/17	15:13	23.507	10.1	1.7	115.41	471
09/19/17	15:14	23.507	10.0	1.7	115.11	468
09/19/17	15:15	23.508	10.1	1.7	113.92	468
09/19/17	15:16	23.507	10.1	1.7	112.76	468
09/19/17	15:17	23.508	10.2	1.7	112.41	469

Average	23.511	10.0	1.7	113.60	472
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Minimum	23.503	9.7	1.5	110.11	463
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Maximum	23.520	10.5	2.2	116.25	485
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Summation	3,526.600	1,502.6	253.3	17,039.26	70,849
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Included Data Points	150	150	150	150	150
Total number of Data Points	150	150	150	150	150

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

Report Generated: 09/19/17 15:43

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 15:44 Through 09/19/2017 17:54

Time Online Criteria: 1 minute(s)

Source	UNIT2					
	Parameter (Unit)	BARPRESS (INHG)	CO2 (PCT)	OPACITY (PCT)	STKTEMP (DEGF)	UNITLOAD (MMW)
09/19/17 15:44		23.507	9.9	1.7	116.57	472
09/19/17 15:45		23.510	9.8	1.7	116.56	474
09/19/17 15:46		23.511	9.9	1.8	116.74	475
09/19/17 15:47		23.510	9.9	1.8	116.87	476
09/19/17 15:48		23.510	9.8	1.8	116.70	478
09/19/17 15:49		23.509	9.8	1.7	116.96	479
09/19/17 15:50		23.508	9.7	1.7	117.11	478
09/19/17 15:51		23.506	9.7	1.7	117.09	477
09/19/17 15:52		23.509	9.7	1.6	117.14	476
09/19/17 15:53		23.510	9.7	1.5	117.04	474
09/19/17 15:54		23.509	9.8	1.5	116.69	472
09/19/17 15:55		23.508	9.9	1.5	116.46	469
09/19/17 15:56		23.509	9.8	1.5	116.56	466
09/19/17 15:57		23.508	9.7	1.6	116.54	464
09/19/17 15:58		23.508	9.9	1.5	116.37	465
09/19/17 15:59		23.508	9.9	1.5	115.99	467
09/19/17 16:00		23.510	9.8 I	1.5	115.94	468
09/19/17 16:01		23.509	4.4 I	1.5	116.11	469
09/19/17 16:02		23.510	9.2 I	1.5	115.86	470
09/19/17 16:03		23.510	10.1 I	1.5	115.46	471
09/19/17 16:04		23.511	10.1 I	1.5	115.36	470
09/19/17 16:05		23.511	10.1 I	1.5	115.41	469
09/19/17 16:06		23.511	10.1	1.5	115.42	471
09/19/17 16:07		23.510	10.2	1.5	115.22	473
09/19/17 16:08		23.507	10.2	1.5	115.20	476
09/19/17 16:09		23.506	10.2	1.4	115.21	477
09/19/17 16:10		23.507	10.3	1.5	115.06	479
09/19/17 16:11		23.509	10.4	1.5	114.63	480
09/19/17 16:12		23.510	10.3	1.5	113.07	480
09/19/17 16:13		23.510	10.3	1.5	112.66	480
09/19/17 16:14		23.510	10.2	1.5	112.63	478
09/19/17 16:15		23.510	10.2	1.5	112.45	476
09/19/17 16:16		23.509	10.2	1.5	112.25	474
09/19/17 16:17		23.508	10.1	1.5	112.37	472
09/19/17 16:18		23.511	10.1	1.5	112.66	471
09/19/17 16:19		23.511	10.2	1.5	112.68	471
09/19/17 16:20		23.512	10.2	1.5	112.48	472
09/19/17 16:21		23.511	10.2	1.5	112.14	473
09/19/17 16:22		23.511	10.3	1.5	111.86	473
09/19/17 16:23		23.513	10.2	1.5	111.95	473

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 15:44 Through 09/19/2017 17:54

Time Online Criteria: 1 minute(s)

09/19/17	16:24	23.513	10.3	1.5	111.92	473
09/19/17	16:25	23.514	10.2	1.6	112.86	472
09/19/17	16:26	23.513	10.2	1.6	113.35	471
09/19/17	16:27	23.513	10.1	1.6	112.96	472
09/19/17	16:28	23.511	10.2	1.6	112.38	472
09/19/17	16:29	23.511	10.3	1.6	112.24	473
09/19/17	16:30	23.513	10.2	1.7	112.19	474
09/19/17	16:31	23.512	10.2	1.7	112.14	475
09/19/17	16:32	23.513	10.3	1.6	112.20	475
09/19/17	16:33	23.512	10.3	1.6	112.49	475
09/19/17	16:34	23.512	10.2	1.7	112.78	475
09/19/17	16:35	23.513	10.2	1.7	112.24	474
09/19/17	16:36	23.513	10.2	1.6	111.87	474
09/19/17	16:37	23.513	10.2	1.6	112.06	473
09/19/17	16:38	23.513	10.1	1.6	112.38	472
09/19/17	16:39	23.513	10.1	1.6	112.52	471
09/19/17	16:40	23.513	10.1	1.6	112.53	469
09/19/17	16:41	23.511	10.0	1.6	115.39	467
09/19/17	16:42	23.512	9.7	1.6	116.00	466
09/19/17	16:43	23.514	10.1	1.7	115.67	467
09/19/17	16:44	23.513	10.2	1.6	115.33	470
09/19/17	16:45	23.513	10.2	1.6	115.01	472
09/19/17	16:46	23.515	10.4	1.6	114.70	476
09/19/17	16:47	23.513	10.4	1.6	114.60	478
09/19/17	16:48	23.513	10.3	1.6	114.97	480
09/19/17	16:49	23.513	10.3	1.6	115.12	481
09/19/17	16:50	23.513	10.3	1.6	115.14	480
09/19/17	16:51	23.512	10.2	1.6	115.29	479
09/19/17	16:52	23.511	10.2	1.6	115.23	478
09/19/17	16:53	23.511	10.2	1.6	115.35	476
09/19/17	16:54	23.512	10.1	1.6	115.68	475
09/19/17	16:55	23.512	10.1	1.6	115.83	473
09/19/17	16:56	23.513	10.0	1.5	116.03	472
09/19/17	16:57	23.513	10.0	1.6	116.14	471
09/19/17	16:58	23.514	10.1	1.5	116.01	471
09/19/17	16:59	23.514	10.1	1.5	115.81	471
09/19/17	17:00	23.513	10.1	1.5	115.54	472
09/19/17	17:01	23.514	10.2	1.6	115.36	473
09/19/17	17:02	23.515	10.2	1.6	115.40	474
09/19/17	17:03	23.515	10.3	1.6	115.35	475
09/19/17	17:04	23.516	10.2	1.5	115.22	476
09/19/17	17:05	23.516	10.1	1.5	115.32	475
09/19/17	17:06	23.517	10.2	1.4	115.60	474

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 15:44 Through 09/19/2017 17:54

Time Online Criteria: 1 minute(s)

09/19/17	17:07	23.516	10.1	1.5	115.65	473
09/19/17	17:08	23.516	10.1	1.5	115.68	472
09/19/17	17:09	23.517	10.1	1.5	115.63	471
09/19/17	17:10	23.517	10.1	1.5	115.55	471
09/19/17	17:11	23.516	10.1	1.5	115.72	472
09/19/17	17:12	23.517	10.1	1.5	115.57	473
09/19/17	17:13	23.517	10.2	1.5	115.20	474
09/19/17	17:14	23.516	10.2	1.5	115.22	474
09/19/17	17:15	23.515	10.1	1.6	115.52	474
09/19/17	17:16	23.515	10.1	1.6	115.71	473
09/19/17	17:17	23.516	10.1	1.6	115.67	473
09/19/17	17:18	23.516	10.2	1.6	115.63	473
09/19/17	17:19	23.516	10.1	1.6	115.65	473
09/19/17	17:20	23.516	10.2	1.6	115.57	474
09/19/17	17:21	23.516	10.2	1.6	115.49	475
09/19/17	17:22	23.518	10.2	1.6	115.52	474
09/19/17	17:23	23.518	10.2	1.7	115.52	474
09/19/17	17:24	23.516	10.0	1.7	115.44	473
09/19/17	17:25	23.515	10.1	1.7	114.05	473
09/19/17	17:26	23.513	10.1	1.7	113.12	473
09/19/17	17:27	23.513	10.1	1.7	112.56	472
09/19/17	17:28	23.514	10.2	1.7	112.55	472
09/19/17	17:29	23.514	10.1	1.7	112.42	472
09/19/17	17:30	23.514	10.3	1.7	112.10	472
09/19/17	17:31	23.514	10.3	1.7	112.19	473
09/19/17	17:32	23.515	10.2	1.7	112.23	473
09/19/17	17:33	23.514	10.3	1.6	112.25	473
09/19/17	17:34	23.515	10.2	1.6	112.08	473
09/19/17	17:35	23.515	10.2	1.7	111.74	473
09/19/17	17:36	23.517	10.2	1.6	111.62	473
09/19/17	17:37	23.517	10.3	1.6	111.83	472
09/19/17	17:38	23.518	10.2	1.7	111.77	472
09/19/17	17:39	23.518	10.1	1.6	112.18	472
09/19/17	17:40	23.518	10.2	1.6	114.35	472
09/19/17	17:41	23.517	10.1	1.6	114.91	472
09/19/17	17:42	23.517	10.2	1.6	114.86	472
09/19/17	17:43	23.518	10.2	1.6	114.98	472
09/19/17	17:44	23.518	10.2	1.6	115.05	471
09/19/17	17:45	23.519	10.2	1.6	115.10	472
09/19/17	17:46	23.519	10.1	1.7	115.07	474
09/19/17	17:47	23.519	10.3	1.7	114.86	474
09/19/17	17:48	23.519	10.3	1.6	114.77	475
09/19/17	17:49	23.520	10.3	1.6	114.98	476

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

C = Calibration

S = Substituted

T = Out Of Control

Average Data

Plant: HUNTINGTON PLANT

Interval: 1 Minute

Type: Block

Report Period: 09/19/2017 15:44 Through 09/19/2017 17:54

Time Online Criteria: 1 minute(s)

09/19/17	17:50	23.520	10.2	1.6	115.05	477
09/19/17	17:51	23.519	10.2	1.6	114.93	477
09/19/17	17:52	23.519	10.3	1.6	114.93	476
09/19/17	17:53	23.520	10.2	1.6	114.98	476
09/19/17	17:54	23.522	10.3	1.6	115.00	475

Average	23.513	10.1	1.6	114.52	473
Minimum	23.506	9.7	1.4	111.62	464
Maximum	23.522	10.4	1.8	117.14	481
Summation	3,080.244	1,267.0	207.8	15,002.12	62,005
Included Data Points	131	125	131	131	131
Total number of Data Points	131	131	131	131	131

F = Unit Offline

E = Exceedance

I = Invalid

M = Maintenance

Report Generated 09/19/17 17:59

C = Calibration

S = Substituted

T = Out Of Control



Project PC17-0001

Appendix E: Calibration Information

Dry Gas Meter Pre-Test and Post-Test Calibrations
Critical Orifice Calibration Certificate



DRY GAS METER CALIBRATION REPORT

Customer:

Date: June 8, 2012Console Serial # 1938Console Model # C-5000 SLDGM Model # S-275 DGM SN # 17176782 Reference Meter S/N 554840Barometric Pressure, P_b : 29.53 in. Hg Tested at: 0 in. Hg - VacuumStandard Pressure : 29.92 in. Hg Standard Temperature : 528 °R

	1	2	3	Units
Orifice Manometer Setting, ΔH	2.00	0.75	6.00	in. H_2O
Elapsed Time	14	22	8	min.

Reference Meter

Final Volume Reading	702.229	713.510	725.165	ft³
Initial Volume Reading	691.001	702.623	714.124	ft³
Total Gas Volume, V_w	11.228	10.887	11.041	ft³
Temperature, Initial	75.3	75.2	74.9	°F
Temperature, Final	75.2	74.9	74.3	°F
Avg Temperature, T_w	75.3	75.1	74.6	°F

Dry Gas Meter

Final Volume Reading	49.378	60.658	72.151	ft³
Initial Volume Reading	38.220	49.777	61.246	ft³
Total Gas Volume, V_m	11.158	10.881	10.905	ft³
Average Temperature, Initial	78.0	77.5	77.0	°F
Average Temperature, Final	77.9	77.0	76.9	°F
Avg Temperature, T_m	77.9	77.2	76.9	°F
ΔH (a)	1.7947	1.7687	1.8171	Avg. ΔH (a) 1.7935
ΔH (a) Tolerance Check	OK	OK	OK	
Gamma, Y	1.0043	1.0007	0.9999	Avg. Y 1.0016
Gamma Tolerance Check	OK	OK	OK	

Calibration Performed By:

$$\Delta H_{(a)} = \frac{0.0319 \Delta H}{P_b (T_m + 460)} \left[\frac{(T_w + 460) \theta}{V_w} \right]^2$$

$$Y = \frac{V_w P_b (T_m + 460)}{V_m (P_b + \Delta H / 13.6)(T_w + 460)}$$



EMCO

EMISSIONS MEASUREMENT COMPANY

ENVIRONMENTAL SUPPLY COMPANY

Huntington 2 PM

METER SERIAL #: 17176782
CRITICAL ORIFICE SET SERIAL #: 1531s
DATE: 9/27/2017
METER ID #: MS-4

ORIFICE #	RUN #	K'	TESTED VACUUM (in Hg)	DGM READINGS (FT')		DGM TEMPERATURES F.		ELAPSED TIME (MIN) @	DGM ΔH (in H2O)	(1) V _m (STD)	(2) V _c (STD)	Y	Y % DIFF WITH OTHER OFFICES	AH%
				INITIAL	FINAL	NET (V _m)	INITIAL							
23	1	0.6365	16.5	671050	675306	3.956	57	48	49	49	48.5	5.00	1.8	2.02
23	2	0.6365	16.5	675306	678375	3.969	57	49	51	51	50	5.00	1.8	2.01
23	3	0.6365	16.5	678375	682364	3.989	57	51	53	51	51.75	5.00	1.8	2.00
18	1	0.4772	17.5	692364	696381	3.117	57	52	53	50	51.75	5.00	1.1	1.92
18	2	0.4772	17.5	696381	699385	3.107	57	53	54	52	53	5.00	1.1	1.96
16	1	0.4322	18	699388	691386	2.798	57	54	55	53	53.75	5.00	0.89	1.93
16	2	0.4322	18	691386	694311	2.825	57	55	55	53	54	5.00	0.89	1.93

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_c (std), and the DGM calibration factor, K . These equations are automatically calculated in the spreadsheet above.

$$(1) \quad V_{m(\text{std})} = K_1 \cdot V_m \cdot \frac{P_{\text{bar}} + (\Delta H / 13.6)}{T_m} \quad = \text{Net volume of gas sample passed through DGM, corrected to standard conditions}$$

$K_1 = 17.64 \cdot \text{in Hg} / (\text{Engl. 0.0365 } \text{Km mHg Metric})$

$T_m = \text{Absolute DGM Eng. temperature } (^{\circ}\text{R - English, K - Metric})$

$$(2) \quad V_{C(\text{std})} = K_2 \cdot V_m \cdot \frac{P_{\text{bar}} + \Delta \Theta}{\sqrt{T_m b}} \quad = \text{Volume of gas sample passed through the critical orifice, corrected to standard conditions}$$

$K_2 = \text{Absolute ambient temperature } (^{\circ}\text{R - English, K - Metric})$

$$(3) \quad Y = \frac{V_{C(\text{std})}}{V_{m(\text{std})}} \quad = \text{DGM calibration factor}$$

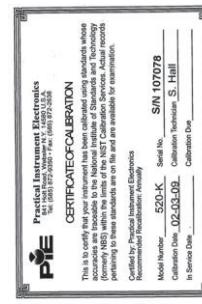
AVERAGE DRY GAS METER CALIBRATION FACTOR, $Y = 0.9739$
INITIAL DRY GAS METER CALIBRATION FACTOR, $Y = 1.016$
% DIFFERENCE = 2.76% (Must be <5%)
AVERAGE ΔH = 1.98

$$\Delta H = \left(\frac{0.759}{V_g(\text{std})} \right)^2 \Delta \left(\frac{V_m(\text{std})}{V_m} \right)$$

40 CFR Part 60, Appendix A, Method 2 §10.3: Temperature Sensors. After each field use, calibrate thermocouples at a temperature within 1.10% of the average absolute stack temperature. A reference thermocouple and potentiometer (calibrated against NIST standards) may be used. The absolute temperature measured with the sensor being calibrated and the reference sensor must agree within 1.5%.

Thermocouple Calibration (using NIST Traceable PIE Model 520 Calibrator)

Ref. Value:	250
Conc. Value:	250
Percent Difference:	0.0%
Acceptance Criteria:	<±1.5%



METHOD 5 CRITICAL ORIFICE CALIBRATION



CRITICAL ORIFICE SET S/N: 1531s

DATE: January 8, 2016

REFERENCE DRY GAS METER	16309842
SERIAL NUMBER:	0.991
CALIBRATION FACTOR, Yc:	

LEAK CHECK: Passed

ORIFICE #	RUN #	CRITICAL VACUUM (in Hg)	TESTED VACUUM (in Hg)	Barometric Pressure per Orifice AVG (Pa _{bar})		DGM READINGS (ft')		DGM INLET		DGM OUTLET		DGM AVG	ELAPSED TIME (MIN)	DGM AH (in H ₂ O)	K' FACTOR (english)	K' FACTOR (metric-liters)	K' FACTOR (metric-m ³)	K' FACTOR VARIATION (%)
				INITIAL	FINAL	NET (V _a)	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL						
31	1	15	17.5	67.132	73.855	6.723	70.9	74.3	74.3	74.5	74.35	6.00	4.12	0.8535	0.7092	7.0921E-04	-0.04	
	2	15	17.5	73.855	80.552	6.727	70.9	74.3	74.1	74.3	74.3	6.00						
23	1	15	18	80.582	86.457	5.875	71.0	74.2	74.0	74.3	74.3	74.20	2.29	0.6367	0.5290	5.2903E-04	0.01	
	2	15	18	86.457	92.331	5.874	70.9	74.0	73.9	74.3	74.3	74.13						
18	1	15	18	92.331	97.558	5.257	71.0	74.1	74.1	74.4	74.4	74.25	8.00	1.44	0.4974	0.4133	4.1330E-04	-0.05
	2	15	18	97.558	102.850	5.262	70.9	74.0	74.0	74.4	74.4	74.20						
16	1	15	18	102.850	108.733	5.883	71.1	74.1	74.1	74.5	74.5	74.30	10.00	1.15	0.4450	0.3698	3.6975E-04	0.03
	2	15	18	108.733	114.613	5.880	71.1	74.1	74.1	74.5	74.5	74.30						
12	1	15	18	114.613	119.720	5.107	71.1	74.0	73.8	74.5	74.5	74.20	12.00	0.58	0.3215	0.2672	2.6716E-04	-0.06
	2	15	18	119.720	124.833	5.113	71.1	73.8	74.1	74.4	74.5	74.20						

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

Calculate the standard volumes of air passed through the DGM and the critical orifices, and calculate the DGM calibration factor, Y, using the equations in US EPA Method 5, Section 7.2.3 (these equations are programmed on the spreadsheet included with each orifice set).

K' = Critical orifice coefficient,

$[(ft^3)(^{\circ}R)^{1/2})]/[(in.Hg)(min.)]$ - English Units

$[(liters)(^{\circ}K)^{1/2})]/[(mm.Hg)(min.)]$ - Metric-Liters Units

$[(m^3)(^{\circ}K)^{1/2})]/[(mm.Hg)(min.)]$ - Metric Units

Critical Orifice Set number 1531s was calibrated in accordance with the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 5, Section 7.2.


Signature
Date
01/08/16